is such that it is difficult to conceive they could recover without great functional and structural impairment. On this point further observation is necessary.

In the second group, which may be called the pigmented group, signs of chronic inflammatory changes are present, but only to a slight degree. On microscopic examination the chief changes are again to be seen in the retiform tissue of the mucous coat. The lymph vessels lying in this tissue between the tubular glands are seen to be dilated, particularly as they approach the muscularis mucosæ, which separates the retiform tissue from the submucous coat. On the walls of the lymph vessels or spaces, especially just above the muscularis mucosæ, are to be seen large cells laden with a dark-brown granular material arranged in large clumps or clusters. The pigmented material, so I am informed, is closely related to melanin and to adrenalin. The muscular coats and Auerbach's plexus also show certain structural changes very similar to those seen by Lieutenant-Colonel R. McCarrison in the bowels of animals fed on a diet deficient in vitamins. This condition is being investigated experimentally by Dr. Louis Gross. From Professor T. R. Elliott's discovery of the action of adrenalin on the motor functions of the bowel, and from Lieutenant-Colonel McCarrison's researches on the effect of a deficient dietary on the adrenal bodies, it seems probable that there may be a relation between "stasis" and the presence of these pigmented cells in the retiform tissue. In this second group the structural changes do not seem to be of a kind which precludes complete recovery.

So far I have not had an opportunity of examining the alimentary tract of cases which have been cured by colectomy. A week ago, however, Mr. Tyrrell Gray submitted to me for report the alimentary canal of a case in which ileo-sigmoidostomy had been done ten years previously. As in a case of Professor Rutherford Morison's, recently reported by Mr. Hamilton Drummond, the great bowel had continued to act, the contents passing from the rectum back into the colon to its cæcal extremity. The various coats of this great bowel, although fed from its distal end, are intact, but certain structural changes are clearly evident within them. The most remarkable change is seen in the small bowel. The total length from pylorus to the termination of the ileum is 7 ft. 9 in. in place of 22½ ft., the average length of the small bowel in an adult male. What this intestine has lost in length has been gained in size of lumen. Its coats are thickened, and it has the diameter of the great bowel. At the best colectomy appears to entail extensive adaptational changes in the small bowel. It is most desirable that the condition established in successful cases of colectomy should be examined and placed on record.

My opinion is that the results of colectomy make it impossible for anyone to accept the conception of the big bowel advocated by Metchnikoff twenty years ago, namely, that it has become a useless structure in the economy of the normal human body. The question which has now to be settled is the following: "Is it better to have no big bowel at all rather than one which is gravely disorganized by disease?" If the latter alternative is chosen, then we have to decide on the nature and degree of the lesion which demands colectomy, and determine the means of recognizing such conditions by clinical methods.

Dr. ARTHUR F. HURST.

The invitation to a physician to take part in a discussion on the after-results of colectomy for colon stasis is, I take it, an acknowledgment that colon stasis is primarily a medical disease. Just as it has become a surgical

aphorism that no operation should be performed on the stomach in the absence of a demonstrable lesion of the stomach and duodenum, so I hope that the day is not far distant when a similar aphorism will be accepted for the colon.

The pathology of the living as revealed by the surgeon has received no more valuable contribution than that of Sir Arbuthnot Lane in his work on intestinal stasis. Though I cannot agree with many of his conclusions I gladly acknowledge my great indebtedness to him, which I feel in common with the whole profession, for his demonstration that intestinal toxæmia is an important factor in the production of many diseases of obscure origin. He has taught us that the intestine requires treatment in these conditions, in some of which it had hitherto been completely neglected. I am sure, however, that this afternoon's discussion will show that, now that this lesson has been learnt, medical treatment is in the vast majority of cases all that is required, and that, in view of its immediate and remote danger, colectomy is rarely, if ever, indicated for intestinal stasis in the absence of gross organic disease.

Partial Colectomy.

I have only had an opportunity of observing the after-results in two cases:

Case I, is that of a lady, aged 40, from whom Sir Charles Gordon Watson excised at my request in February, 1920, a very mobile cæcum, ascending colon and part of the transverse colon for stasis in these parts, accompanied by severe pain and tenderness and general symptoms of toxæmia, all medical treatment having failed to give relief. The excised colon was found by Sir Arthur Keith to show the pigmentary changes he has just described. The patient has very slowly improved, but she is now, two years after the operation, still constipated and still far from strong, though so much better that she is very glad the operation was performed.

The second patient only consulted me some years after the operation had been performed.

Case II: Six Abdominal Operations, including Partial Colectomy for Hypochondriasis: no Aggravation of Symptoms.—Colonel R., aged 54, had adhesions divided in 1900, a gastro-enterostomy performed without any ulcer or obstruction being found in 1907, an ileo-sigmoidostomy in 1912, and 4 in. of small intestine with the cæcum, ascending colon and half the transverse colon removed in 1915. In 1916, the end of the small intestine became dilated and was removed, and in 1918 pylorectomy was performed. In spite of his six operations I was unable to ascertain from him, when he came into New Lodge Clinic in January of this year, that he had ever had anything more than vague discomfort in the right side of his abdomen. Although a typical hypochondriac, he seemed to be in remarkably good health in spite of his six operations. His chief complaint was that, although only 54, he got tired towards the end of his second round of golf. He had hoped in vain that the colectomy or at least the pylorectomy would have altered this unsatisfactory state of affairs. He was disappointed to find that medical treatment could not do for his golf what six operations had already failed to accomplish.

The success of the operation in the first case, though incomplete, has been great enough to encourage me to advise it again, if a similar case were to come under my care, in preference to the various colopexies recently recommended—the results of which have not impressed me favourably—and certainly in preference to complete colectomy. I have, however, so far not seen any other patient with ascending colon stasis who did not improve sufficiently under medical treatment to make it undesirable to undergo the risk of an operation, the results of which are uncertain.

Total Colectomy.

I have had the opportunity of observing the after-effects in a considerable number of cases of total colectomy performed for intestinal stasis, although I have myself never felt justified in advising a patient to undergo the operation. With regard to the immediate mortality, I have obtained the statistics of the Guy's cases since 1914. A continuous record is thus available, which includes those recorded by Sir Arbuthnot Lane in 1908, and those published by Dr. W. S. Bainbridge of New York, from his analysis of all Sir Arbuthnot Lane's female hospital cases between May, 1909, and October, 1913. Cases of gross organic disease, such as ulcerative colitis and cancer, are excluded. A small number operated upon during the war, of which no records have been preserved, have also of necessity been omitted. Among the thirty-seven cases in the first series, seven died as the immediate result of the operation, one died six months later from intestinal obstruction, and one a year later from exhaustion. The immediate mortality was therefore 19 per cent., and the total mortality 24 per cent. In the second series of cases three out of fifty died before leaving hospital, and one after a secondary operation. In the last series of 111 cases operated upon between 1914 and 1921, the mortality was 18 per cent. The total mortality of the 198 cases is 16·5 per cent. It is interesting to note that since 1914 the number of cases operated upon has steadily diminished, until only two colectomies were performed in 1919, one in 1920 and none in 1921.

COLECTOMIES PERFORMED FOR INTESTINAL STASIS AT GUY'S HOSPITAL, 1904-1921.

Year	Number of cases	Deaths	Mortality
1904-08	37	9	24·0 (Lane)
1909-13 (female only)	50	4	8·0 (Bainbridge)
1914	40	5	12·5
1915	34	4	12·0
1916	12	4	33·0
1917	9	3	33·0
1918	13	4	30·8
1919	2	0	—
1920	1	0	—
1921	0	0	—
Total	198	33	16·5

Sir Arthur Keith has asked what becomes of the severe cases of intestinal stasis, if they are not operated upon. One thing I can say is that they do not die. With the exception of a case recorded by Mr. Lockhart-Mummery, I have never heard of death occurring as a result of intestinal stasis. The colon has an extraordinary power of recovery. In amœbic dysentery the changes in all coats of the colon may be exceedingly severe, far more serious than anything described by Sir Arthur Keith as a sequel of intestinal stasis, and yet complete recovery almost invariably takes place under treatment with emetine.

It can therefore rarely, if ever, be justifiable to recommend for intestinal stasis complete colectomy, which has an average mortality of 16·5 per cent. in the most experienced hands. Symptoms of intestinal stasis are rarely sufficiently serious to warrant anything but comparatively simple medical treatment. In the few cases, in which the local or general symptoms, or both, are of such gravity that the patient's life is rendered miserable, prolonged institutional treatment by non-surgical means should be carried out before the question of surgery is considered. I have often been appalled to see how

light-heartedly colectomy has been recommended, often for comparatively trivial symptoms, without any real trial of medical treatment having been made. It is sometimes forgotten that there are other aperients besides paraffin, and that psychotherapy, diet, massage, exercise, intestinal lavage, and perhaps bacteriology each has its place in the treatment of intestinal stasis.

Among the very large number of severe cases of intestinal stasis I have seen since I first became interested in the subject as a result of my X-ray investigations of the normal and pathological intestines fifteen years ago, I have only seen two in which the whole colon was involved in stasis, and in which the patient became steadily more poisoned and suffered more and more pain in spite of every form of medical treatment I could devise. In one, Sir Arbuthnot Lane performed an ileo-sigmoidostomy in 1911, and the relief, which was almost instantaneous, has proved permanent and complete. In the other, the same operation met with indifferent success, and a secondary cæcostomy was performed by Mr. Percy Sargent six months later, owing to the accumulation of fæces in the short-circuited colon. One other patient of mine, whose symptoms were less severe, had a colectomy performed by Sir Arbuthnot Lane, whilst I was abroad in 1915. She required a second operation for adhesions in 1916, but since then she has been extremely well; she presents a real triumph for the operation, though considering the absence of any serious local or general symptoms I should not myself have felt justified in advising a colectomy.

In discussing the later results of the operation, it is obvious that only cases in which a year at least has elapsed since its performance need be considered. In Sir Arbuthnot Lane's 1908 report, out of sixteen such cases ten were relieved to a greater or less extent, and in six the result was only moderately good. Five out of Bainbridge's 1909 to 1913 series of forty-seven survivors had returned to the hospital by 1913 suffering from adhesions and requiring further operation; one of these, with pain and vomiting associated with pregnancy, died from general peritonitis after a second operation. During the last few years numerous cases have been admitted to the surgical wards at Guy's for various complications following colectomy, and in many instances a second operation has had to be performed.

The medical treatment of these unsuccessful colectomy cases is most unsatisfactory, and they generally become hopeless chronic invalids. In the following case, quite unexpected improvement in the severe toxæmic symptoms, which had resulted from a colectomy performed for intestinal stasis, followed treatment with sour milk.

Severe Toxæmic Symptoms after Colectomy for Intestinal Stasis relieved by Sour Milk.—Mr. K., aged 50, had complete colectomy performed in 1918 for constipation and indigestion, neither of which appears to have been very severe. After slight temporary improvement he began to suffer from pain in the lower part of the abdomen. This gradually became more severe, and for some months before he was admitted to New Lodge Clinic in February, 1921, it had been continuous through the whole day. In addition it awoke him at about 3 a.m. and prevented him sleeping the rest of the night. He passed liquid stools three or four times a day with the aid of a little aperient, without which he was very constipated. He said that since the operation his nerves were "all to pieces," that he had lost confidence in himself, everything looked black, and that he could not manage his business. The X-rays showed that the lower end of his ileum had become very greatly dilated. The sigmoidoscope passed without resistance its full length into an enormously dilated bowel. Treatment by diet, intestinal lavage and drugs failed to give relief. We then tried the effect of sour milk. The result was surprisingly satisfactory. All the symptoms, which had made life miserable for over a

year, disappeared within a few days. He has remained completely well ever since, with the exception of ten days recently spent on the Continent, when he was unable to obtain the sour milk. Two days after having it again on his return home he felt quite well.

The ileo-cæcal sphincter is as important for intestinal digestion as the pylorus, and makes it possible for over 95 per cent. of the digestible part of the food to be absorbed before the cæcum is reached. In the cæcum and ascending colon the remainder, together with a considerable amount of water, is absorbed. Consequently, when either the whole colon or the proximal part alone, together with the ileo-cæcal sphincter, is removed, intestinal digestion is severely disturbed, and it is comparatively rare for the remaining part of the bowel to take on the functions of the parts removed so satisfactorily that the patient can ever again become completely fit, even if certain local and general symptoms disappear as a result of the operation.

The loss of the ileo-cæcal sphincter, which normally acts as a barrier preventing the bacterial activity, which is natural in the colon, from occurring in the small intestine, also results in the fluid contents of the lower end of the ileum undergoing excessive fermentation and putrefaction. Intestinal flatulence results, which often causes much discomfort and even pain, especially at night, and severe insomnia may follow. A temporary diminution in the symptoms of intestinal toxæmia not infrequently follows the operation, but sooner or later these generally return, though often only in a milder form. It is this bacterial invasion of the small intestine which leads to the very disappointing recurrence of certain serious symptoms, which occasionally disappear in an almost miraculous manner after colectomy. This happened, for example, in a very severe case of Raynaud's disease, in which the immediate result of colectomy had been an astonishing improvement in the symptoms which had been present for some years. But the improvement was already less obvious by the time the patient left the hospital, and the final result of the operation was entirely unsatisfactory.

I have not yet seen any convincing evidence from the results of colectomy that intestinal intoxication plays any part in the production of Graves' disease or diabetes. The improvement, which has sometimes followed the operation in rheumatoid arthritis and especially in Still's disease, can be obtained with far less danger and much better prospects of permanency by eradicating the primary source of the intestinal infection, which is generally in the mouth or pharynx and occasionally the appendix, and treating any residual infection by bacteriological and other non-surgical measures.

Peristalsis in the colon is not continuous, as in the stomach and small intestine, but only takes place three or four times in the day, generally immediately after meals. A powerful contraction, beginning, as a rule, in the ascending colon, carries the whole of the contents of the large intestine into the pelvic colon, from which they are propelled by the early morning peristalsis into the rectum; this gives rise to the desire to defæcate, which normally initiates the reflex act of defæcation. Partial or complete colectomy removes the segment of the colon in which the majority of peristaltic waves arise, and complete colectomy removes all or most of the part which retains the fæces till just before defæcation. It is, therefore, not surprising that the bowels should act with considerable irregularity after colectomy. The stasis in the colon, for which the operation is performed, is sometimes replaced by stasis in the small intestine. More often, however, the continuous arrival in the rectum of fluid fæces from the ileum leads to the frequent passage of fluid stools. It is rare

for anything approaching the regular morning call to defæcation with its sequel, the passage of a normal formed stool, to occur after a complete colectomy.

The following case is an example of the intestinal disturbance which may follow colectomy:—

A lady, who had been in fairly good health with some constipation, but no diarrhœa, since her colon was excised for chronic intestinal stasis eight years before, was suddenly seized with the most intractable diarrhœa, which for nine months did not respond to any treatment by drugs, diet, or starvation, and almost proved fatal. There was no apparent cause, but this may perhaps be an instance of the inability of the body, in the absence of the colon, to deal with certain forms of poisoning, Thus very small doses of morphia made her feel extremely ill, and I understand that similar intolerance to morphia is present in most, if not all, patients who have had their colon removed, probably owing to the fact that the colon is normally the chief channel for its excretion. In the seven years which have since elapsed her intestines have been a constant and painful source of anxiety. She tends to become constipated, but all aperients give rise to fluid stools, the passage of which does not give adequate relief, and she constantly feels that there is an accumulation of fæcal material which has been left behind. This condition lasts for weeks, the patient feeling more and more ill until finally a severe attack of diarrhœa occurs, which eventually gives relief. The frequent straining has led to a severe prolapse, which has recently been relieved by operation.

I can summarize my views on the subject in the following way: The majority of cases of intestinal stasis, which are treated with sufficient perseverence by non-surgical means, do very well. Even in the very small number in which little or no improvement follows medical treatment, the high mortality, the danger of complications, and the uncertain prospect of lasting relief after colectomy, make it doubtful whether the operation should ever be performed in the absence of gross organic disease.

Dr. Victor Pauchet (Paris).

Chronic intestinal stasis now occupies an important place in medico-surgical pathology, and should, for the future, be termed "Arbuthnot Lane's disease."

Total colectomy is a well-defined operation, indicated not only in cases of intestinal stasis, but also in cancer of the colon, in megacolon (Hirschsprung's disease), in severe forms of colitis, and in volvulus, whether accompanied or not by intestinal occlusion. Total colectomy should be designated as "Arbuthnot Lane's operation."

Why is colectomy warmly advocated by some and strongly opposed by others? Because those who have frequently performed this operation have observed some failures, but also brilliant successes. While its partisans dwell upon the successful results its opponents maintain that:—

(*A*) *Colectomy is a serious operation.*

(*B*) *The remote results are not uniform*, some patients suffering from (*a*) *diarrhœa;* some from (*b*) *constipation;* and others from (*c*) *persistence of the pre-operation troubles:* neuralgia, asthenia, loss of weight, indigestion, menstrual irregularities, &c. I know a whole group of patients who have undergone colectomy and are still suffering from neurasthenia; they are satisfied with the result of the abdominal operation and are greatly improved; however, they still imagine that they are a prey to all sorts of illnesses.

Favourable Results.—These are apparent in the disappearance of the constipation, the headache, migraine, dyspepsia and asthenia; the patient